SPEECH ENCODER ADAPTIVELY APPLYING PITCH PREPROCESSING WITH CONTINUOUS WARPING

Abstract of **WO0011654**

A multi-rate speech codec supports a plurality of encoding bit rate modes by adaptively selecting encoding bit rate modes to match communication channel restrictions. In higher bit rate encoding modes, an accurate representation of speech through CELP (code excited linear prediction) and other associated modeling parameters are generated for higher quality decoding and reproduction. A speech encoder employing various encoding schemes based upon parameters including an available transmission bit rate. In addition, the speech encoder is operable to identify and apply an optimal encoding scheme for a given speech signal. The speech encoder may be applied code-excited linear prediction when the available bit rate is above a predetermined upper threshold. Pitch preprocessing, including continuous warping, may be applied when it is below a predetermined lower threshold. The encoder considers varying characteristics of the speech signal including the long term prediction mode of a previous frame, and a spectral difference between the line spectral frequencies of a current and a previous frame, a predicted pitch lag, an open loop pitch lag, a closed loop pitch lag, a pitch gain, and a pitch correlation.
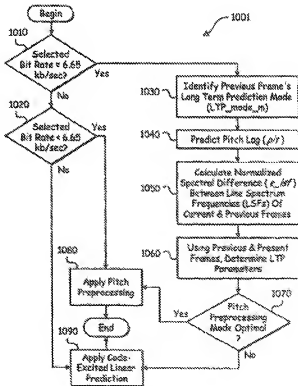
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Claims of **WO0011654**

CLAIMS

We claim:

1. A speech encoding system using an analysis by synthesis approach on a speech signal having varying characteristics, the speech encoding system comprising:
an encoder that adaptively selects a first long term prediction mode or a second long term prediction mode;
the first long term prediction mode comprises pitch preprocessing; and
an adaptive codebook coupled to the encoder.

2. The speech encoding system of Claim 1. wherein the second long term prediction mode involves code-excited linear prediction.

3. The speech encoding system of Claim 1, wherein the pitch preprocessing involves continuous warping.

4. The speech encoding system of Claim 1, wherein at least one of the varying characteristics comprises a bit rate.

5. The speech encoding system of Claim 1, wherein at least one of the varying characteristics comprises a stationary characteristic.

6. The speech encoding system of Claim 1, wherein at least one of the varying characteristics comprises a line spectral frequency.

7. The speech encoding system of Claim 1, wherein at least one of the varying characteristics comprises a pitch correlation.

8. The speech encoding system of Claim 1. wherein at least one of the varying characteristics comprises a closed loop pitch gain.

9. The speech encoding system of Claim 1, wherein at least one of the varying characteristics comprises a pitch gain.

10. A method used by a speech encoding system that applies analysis by a synthesis coding approach to a speech signal having varying characteristics, the method comprising:
adaptively selecting a first or a second encoding scheme upon identification of at least one of the varying characteristics of the speech signal; and
the first encoding scheme is pitch preprocessing involving continuous warping.

11. The method of Claim 10, wherein the first encoding scheme comprises a codeexcited linear predictor.

12. The method of Claim 10, wherein adaptively selecting a first or a second encoding scheme is further based upon a stationary characteristic of the speech signal.

13. The method of Claim 10, wherein adaptively selecting a first or a second encoding scheme is further based upon a bit rate.